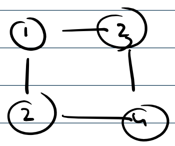
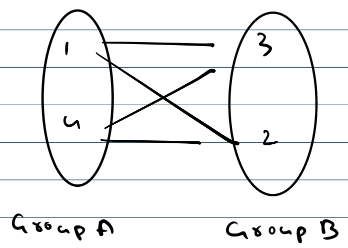
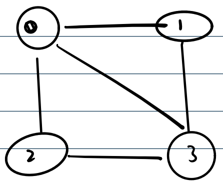
13 December 2025 10:04

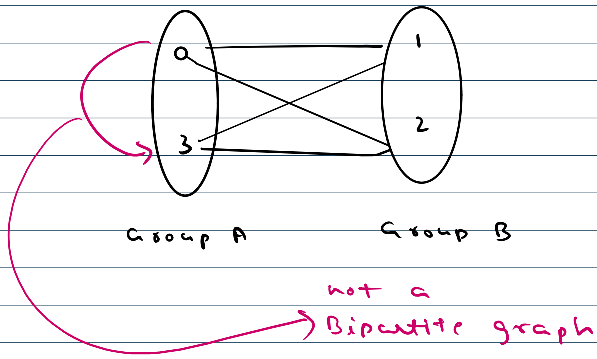
## Bipartite Graph

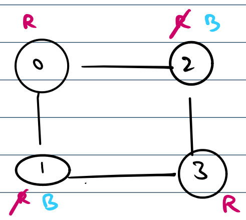
We can split the vertices into two seperate groups (Group A & Group B)
every edge must connect a vertex from Group A to a vertex of Group B.
No edge is allowed between vertices in the same group.

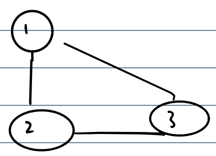


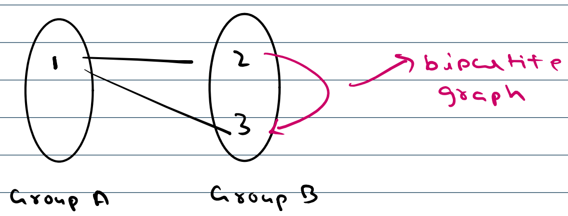




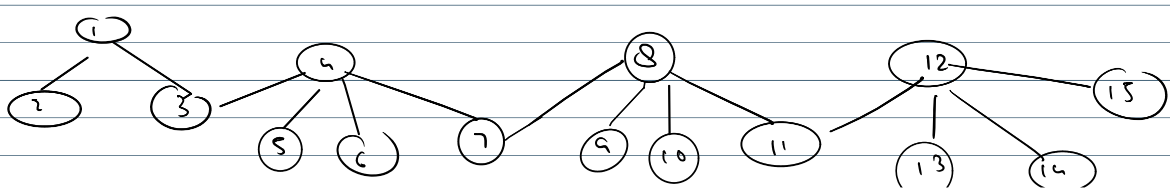



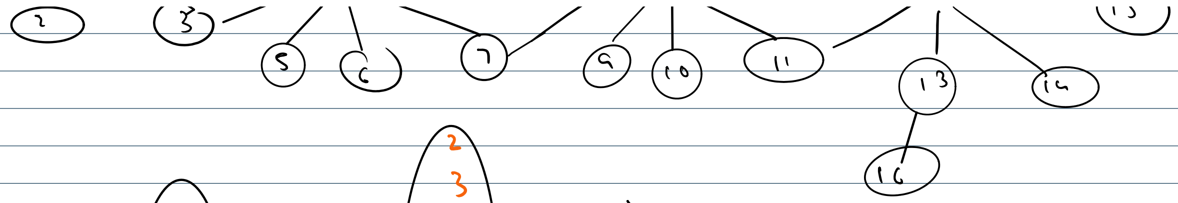



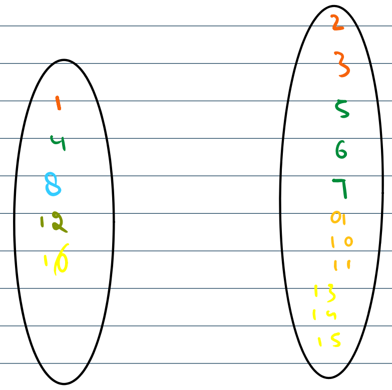



Graph
- → Acyclic → always bipartite
- → Cyclic

## Acyclic graph

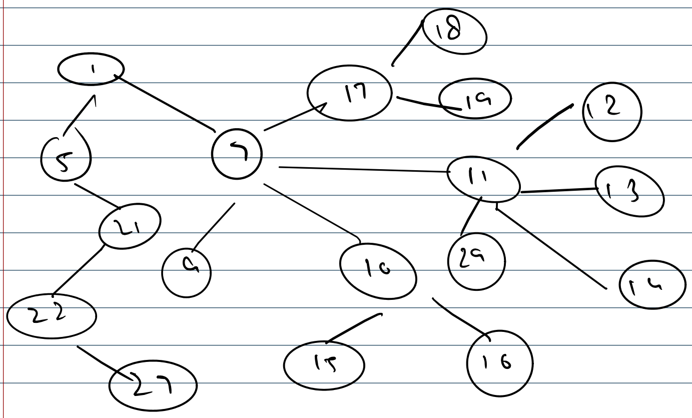


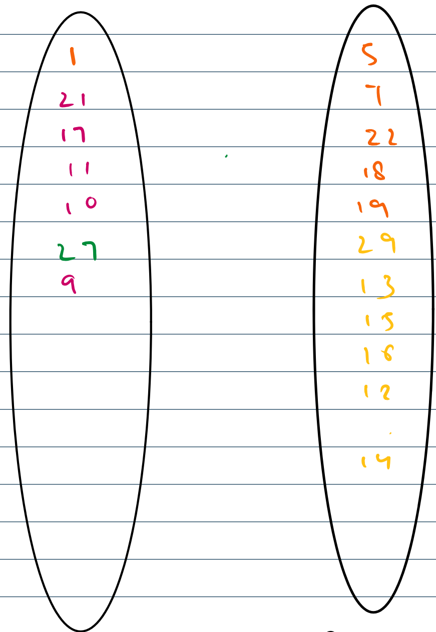



Group A Group B

⇒ Bipartite Graph



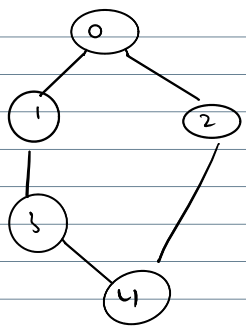



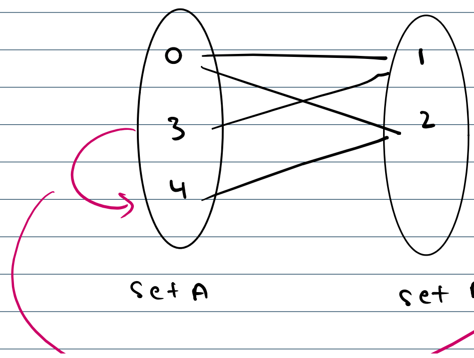

Group A Group B

Every acyclic graph is a bipartite graph

cyclic graph → odd length cycle
→ even length cycle

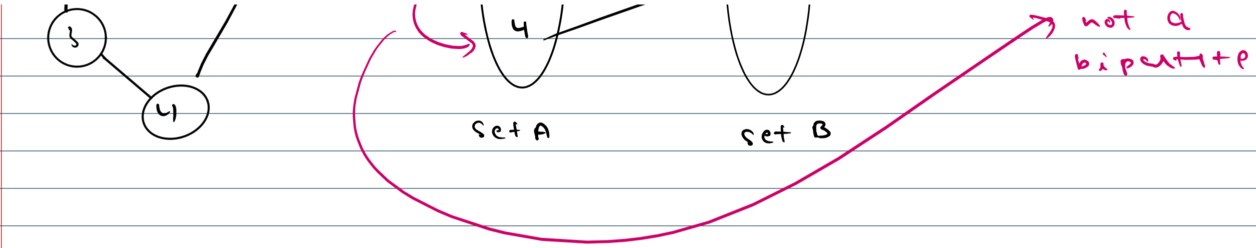
odd length cycle

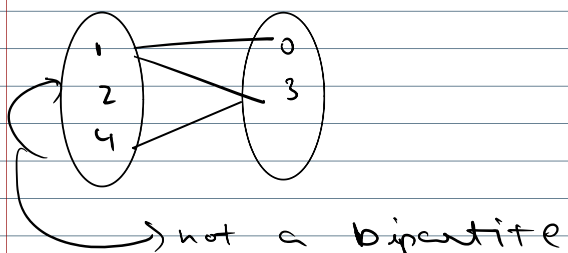


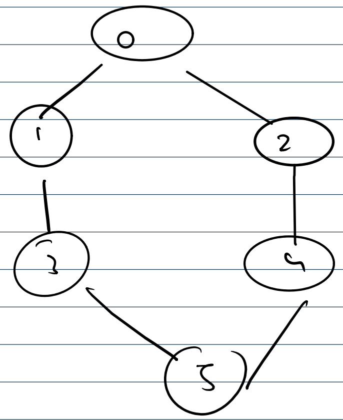

Set A Set B

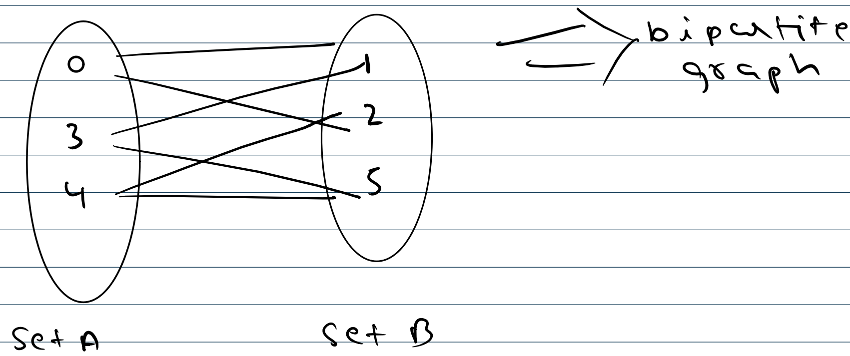
→ not a bipartite




## Even length cycle



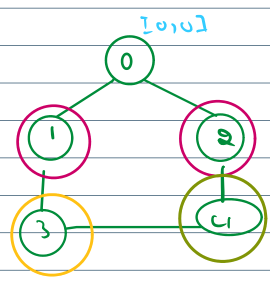




Graph acyclic => Bipartite
even length cyclic

Not a bipartite => odd length cycle

## odd length cycle

1. remove
2. ignore if already vis
3. marked visited
4. self work
5. add unvisited nbrs

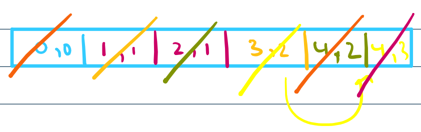



| vtx | dis |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 2 | 1 |
| 3 | 2 |
| 4 | 2 |

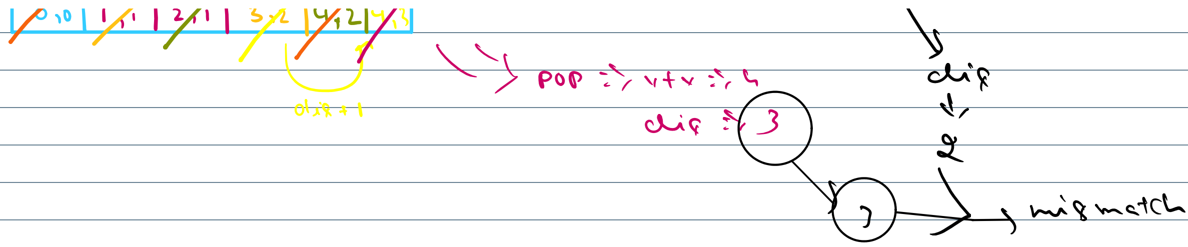
visited

=> HashMap
vertex -> dis

dis

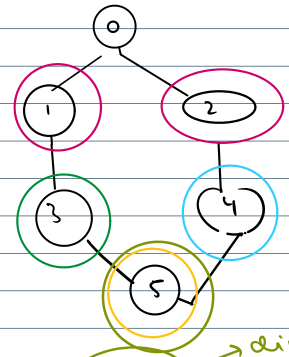



pop => vtx => 4



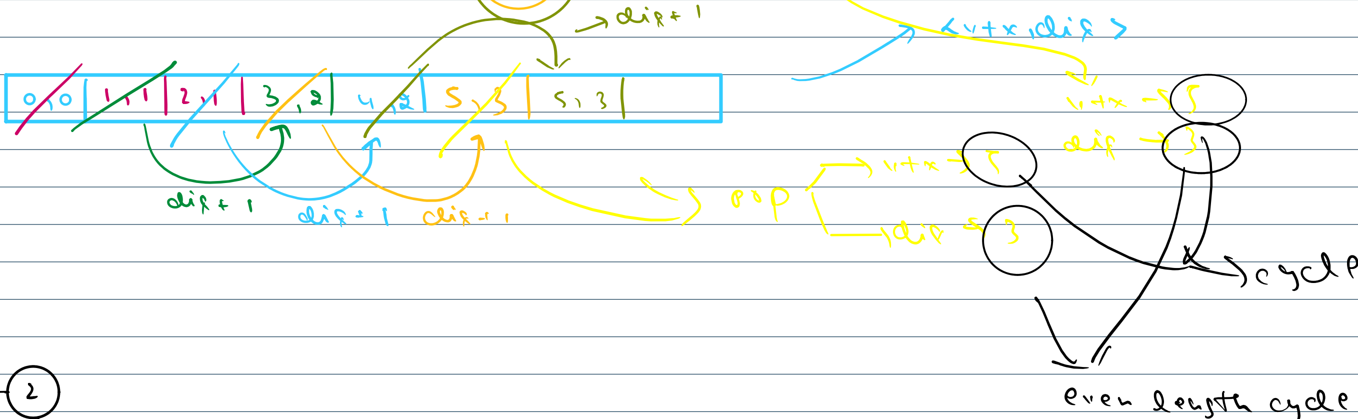

## Even length cycle

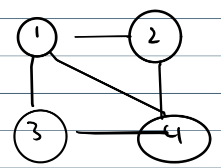
1. remove
2. ignore if already vis
3. marked visited
4. ~~self work~~
5. add unvisited nbrs



| vtx | dis |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 2 | 1 |
| 3 | 2 |
| 4 | 2 |
| 5 | 3 |

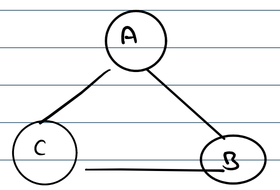
visited

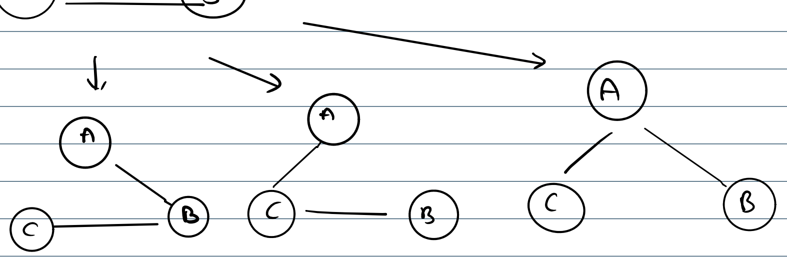


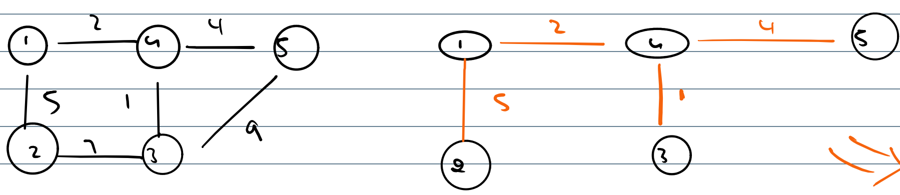



## Spanning Tree

subset of graph, which all the vertices with minimum possible no. of edges, also it cannot have a cycle or disconnected







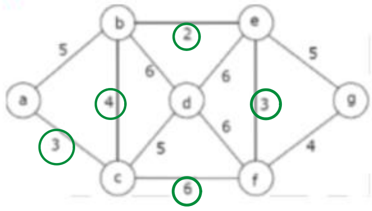
MST

→ MST

↓

Pick the min edge

❓ Consider the following graph:




**Which one of the following is NOT using Kruskal's algorithm?**

**(A)** (b,e), (e,f), (a,c), (b,c), (f,c), (e,d)

**(B)** (b,e), (e,f), (a,c), (b,f), (b,c), (e,d)

**(C)** (b,e), (a,c), (e,f), (b,c), (f,c), (e,d)

**(D)** (b,e), (e,f), (b,f), (b,c), (a,f), (e,d)